BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

No Necking or Sausaging in BNL's Superconducting Cables

"Necking and sausaging" may not sound like a serious threat to most people. To the superconducting magnet builders of the Lab's Relativistic Heavy Ion Collider (RHIC), however, this is a technical term describing a damaging condition to be avoided.

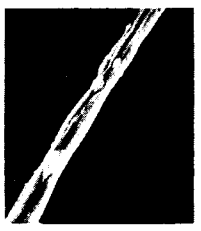
Like many accelerators, RHIC's successful operation will depend on the quality of its magnets, which must be completely uniform to bend and guide the beams of particles smoothly around the rings. One of the most important factors in the magnets' quality is the superconductor cable from which they are built.

Because of the numbers involved — RHIC will use 1,740 superconducting magnet elements — industry is supplying the cable and using it to build many of the magnets based on BNL design. Preparing specifications for industrial cable and wire fabrication has been a central part of the RHIC research and development effort since its inception in the early 1980s.

"Buying the cable is not a simple matter of writing an order," said Arthur Greene, a physicist in the Accelerator Development Department (ADD). "BNL had to design and specify many steps of the material's fabrication, knowing that mistakes would greatly increase costs."

The wire for the cables is 0.026 inches in diameter and comprises 3,500 thousand superconducting filaments, each less than one-tenth the diameter of a human hair, surrounded by copper.

Hard nodules can form on the surface of the niobium-titanium filaments, making them look like strings of narrow-necked sausages. The phenomenon is drolly termed "necking and sausaging" — but its result is not droll. It causes a serious reduction of electric current flow in the cable.



Above: "Necking and sausaging" in niobium-titanium filaments.

Below: Clean filaments.

(From left) Brian Vogt, Domenick Milidantri, Henry Strelecki and Alan Morgillo are shown with some of the test equipment used to verify mechanical properties of RHIC cable.

"We were frustrated by this effect early in the 80s," recalled Greene. "Along with our collaborators from the University of Wisconsin and Lawrence Berkeley Laboratory, we were preparing specifications for the RHIC and Superconducting Super Collider (SSC) cable wires. Bob Sabatini and Masaki Suenaga of the Department of Applied Science assisted by making important microscopy studies that clearly showed the necking and sausaging. We brought the problem up at niobium-titanium workshops being held at that time."

Sponsored by the U.S. Department of Energy, the workshops helped ensure that superconductor material for magnets for RHIC and the SSC would meet the highest performance standards. Attendees from national laboratories and industry pooled their expertise, and their research and development efforts helped improve this area of superconductor technology.

Necking and sausaging were found to occur during the heating in the multifilamentary wiremaking process. The copper that holds the filaments in place combined with the titanium to form hard nodules, which caused the filaments to "neck and sausage" as they were drawn to the smaller diameter wire needed for cable.

"The problem was solved by surrounding the filaments with a barrier of ultrathin niobium, a technology that was first developed in France, but not generally used in this type of application," said Greene. "Once this was done, the superconductor's performance and uniformity improved dramatically."

The necessary layer of niobium surrounding each filament became part of the wire design specifications.

"In addition, we developed a system of quality controls," said Greene. "According to their expertise, differ-

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Women's History Month Profile

Brookhaven Town Honors Sharon Smith

Oceanographer Sharon Smith, who heads the Oceanographic & Atmospheric Sciences (O&AS) Division in the Department of Applied Science (DAS), is one of ten women who will be honored for their accomplishments and contributions to Brookhaven Town. The awards will be presented at the Town's sixth annual Women's Recognition Night, on Tuesday, March 24, as part of its observance of Women's History Month.

Smith, the only woman to head a BNL scientific division in the Lab's 45-year history, is being cited for excellence in the field of science. The nine other honorees are accomplished in the fields of business, communication, education, government, law, medicine, religion and social service.

Since Smith will be at an out-of-town oceanography conference at the time of the awards presentation, she has asked Louise Hanson, DAS, to accept the honor in her stead.

"I regret that I cannot attend this special evening, as it was a great privilege to have been selected, first by the women scientists at the Lab who submitted my name to the Town and, then, by the Town panel that made the final selection," comments Smith. "This award reminds me that, although women have accomplished so much, we have so far to go to become fully integrated into the mainstream and not have to struggle because we are women for the jobs and recognition."

Continues Smith, "Being recognized by Brookhaven Town and other recent events in my life have caused me to reflect on how I arrived where I am today in my career. It was not because of any grand plan conceived at an early age and pursued with single-mindedness. Instead, it was first a matter of having superb female math and science teachers in high school who let me know it was okay to do science and do it well. Then, after having the support of undergraduate and graduate mentors, it was a matter of finding what felt right intellectually, finding a niche where my talents and creativity fit."

Sharon Smith

She found her niche as a biological oceanographer specializing in the ecology of zooplankton, microscopic animals that move along with the ocean currents. Though tiny, zooplankton are important because their abundant presence at the bottom of the food chain is a critical link to fish production that sustains human life.

Smith is noted for her pioneering studies of minute crustaceans in the oceans' fertile regions. To understand why these animals flourish in certain areas of open ocean, she has conducted shipboard research in waters as diverse as the Indian Ocean, Bering Sea, Atlantic Ocean and Greenland Sea.

"In my own field of science, there have been huge improvements for women oceanographers over the last 20 to 30 years," reports Smith. "The field went from allowing women to go to sea to do their research only once a year on specially organized, all-female expeditions to having women organize and lead major international expeditions."

Prior to Smith's work, oceanographers thought that the zooplankton population grows only in response to increases in the amount of phytoplankton, minute ocean plants, that are available for food and that the population's growth is linear. Smith, however, has found not only that three mechanisms account for the success of zooplankton populations in certain ocean areas, but also that these mechanisms result in a non-linear response in the rise or decline of the zooplankton population.

The three mechanisms are: ocean currents that aggregate both zooplankton and phytoplankton; a reduced diversity of the minute plants, which restricts the feeding of minute animals, but, nonetheless, allows them to grow explosively; and resting stages in zooplankton development, which allow them to survive phytoplankton famines successfully.

"In simple terms, the productive areas of the world's oceans have

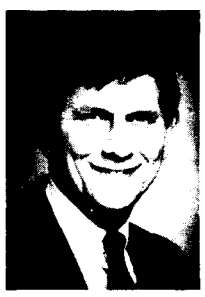
(continued on page 2)

AUI Lecture

DNA, Crime And Disease

DNA, the molecule that transmits genetic information from one generation to the next, is becoming an increasingly useful investigative tool for both medical clinicians and the courts.

Recent research by C. Thomas Caskey, a physician-researcher at the Baylor College of Medicine in Houston, Texas, shows that certain sequences of nucleotides in DNA, known as repeats, are linked to some inherited diseases. These same DNA repeats also provide a sensitive and rapid method of DNA fingerprinting, a form of biological identification that is gaining acceptance in the courts.



C. Thomas Caskey

Caskey will focus on these two uses of DNA in an AUI Distinguished Lecture to be held on Thursday, March 26, at 4:30 p.m., in Berkner Hall. The title of his lecture is "Simple DNA Repeats: Cause of Disease and a Criminal Investigative Tool."

There are many thousands of DNA repeats in the human genome, but the exact number is highly variable from one individual to the next. Because of their variable character, DNA repeats have become the dominant genetic mapping method to localize disease genes.

For instance, Caskey and his colleagues have determined that the

(continued on page 2)

AUI Lecture (cont'd)

propensity for two muscular diseases — myotonic dystrophy and X-linked spinal and bulbar muscular atrophy — as well as a form of mental retardation called the Fragile-X syndrome, can be identified by the number of DNA repeats in an individual's genes. The most mutable sequences expand in families over many generations, leading to disease with progressive severity of symptoms.

These same variable genetic sequences are used for DNA fingerprinting. This form of biological identification has now been accepted in three federal court jurisdictions and passed appeal in one. It has been used in forensic cases and in military missing-in-action cases.

C. Thomas Caskey is the Henry and Emma Meyer Professor in Molecular Genetics and a professor of medicine, biochemistry and cell biology at the Baylor College of Medicine. He is also director of the Institute for Molecular Genetics and does research in the Howard Hughes Medical Institute, both at the college. A former president of the American Society of Human Genetics, he is currently a member of many advisory committees, including the U.S. Department of Energy's advisory committee on mapping the human genome.

In 1965, Associated Universities, Inc., started the AUI Distinguished Lecture program in which experts speak on topics of general interest.

Cables (cont'd)

ent groups of our staff specialize in checking the various properties of the wire and cable being supplied to us."

Among these ADD groups is the Superconducting Materials R&D Section headed by William Sampson, who, helped by Meyer Garber, Arup Ghosh, Kenneth Robins and technicians Joseph D'Ambra, Edward Sperry, Carl Avent, Richard McCluskey and Erno Ostheimer, measures wire and cable electrical properties. Production Engineering Section members Domenick Milidantri, Michael Morrow, Henry Strelecki and Brian Vogt, supervised by Alan Morgillo, check mechanical requirements.

One vital mechanical requirement is the thickness of the cable's midsection, which must be exact. Otherwise, when the cable is coiled to form a magnet, the size of the coils will not follow design specifications.

Coil size determines the exact placement of conductor elements — and thus, the field uniformity. It also decides the prestress, or internal pressure that provides resistance to coil movement, and therefore, to magnet quenching. When this occurs and a magnet is quenched, it is no longer superconducting and can no longer guide the particle beam on its path. Hence, the whole accelerator performance could be jeopardized by a cable of nonstandard dimensions.

Another important requirement is the twist of the wire, which gives it electrical stability when superconducting. Checking this property has been easier since Vogt thought of a simple, but accurate, method of untwisting etched wire so that the filaments are straight. The rotation of the untwisting fixture can be measured to give reproducible results, which has uncovered errors in some companies' twist methods which are now being corrected.

"We do microscopic analysis on everything from the filaments in the wire to the surface condition of the cable, where sharp edges or burrs on the surface might cut the cable insulation," Greene added. "Many people have worked very hard on the project and it's going well. The vendors are following BNL requirements carefully, and we're confident that the superconductor for RHIC will be of high performance and very uniform." — Liz Seubert

Joint BWIS-Solid State Seminar

Adsorption in Alkali Metals

If you placed a golf ball on a layer of other golf balls, you would rightly expect it to settle in a hollow site between golf balls. Similarly, solid-state physicists have long assumed that a single atom would behave the same way when adsorbed, or retained, on a simple flat substrate.

This assumption, however, has been proven incorrect — at least in the case of several adsorbates of alkali metals, those elements in group I of the periodic table.

The phenomenon of "top-site" adsorption will be discussed on Thursday, March 26 by Renée Diehl, an associate professor physics at the Pennsylvania State University. She will talk about "Some Surprises in Alkali Metal Adsorption" in a joint Brookhaven Women in Science (BWIS)-Solid State Physics Seminar, at 1:30 p.m., in the small seminar room of Physics, Bldg. 510.

Renée Diehl

As Diehl will explain, when atoms adsorb on a simple surface, the adsorption site is one of the most fundamental parameters describing the system. She will describe the experiments that have found top-site adsorption of alkali metal adsorbates on close-packed metal surfaces, as well as offer possible explanations for its occurrence.

Time permitting, Diehl will also describe the anomalous-vibration behavior that has been observed for alkali metals on graphite, showing again that physicists' knowledge of adsorption potentials is not as comprehensive as previously believed.

Renée Diehl earned her Ph.D. from the University of Washington in May 1982, then went to the University of Liverpool, England, as a postdoctoral research assistant in the Department of Chemistry. She became a lecturer in the Physics Department in 1983, remaining there until January 1990, when she joined Penn State.

Anyone interested in the joining the lecturer for dinner the evening of the lecture should call Lisa Tranquada, Ext. 7731.

Science Education Flies High

A three-day workshop that teaches teachers to teach balloon flying "may be the most unusual program we've helped with yet," said Karl Swyler of the Office of Scientific Programs (OEP), "but it worked very well."

The Balloon Project Implementation Workshop was hosted by OEP at BNL on February 25-27, to introduce one of the creative educational programs for children designed by The Balloon Project, Inc., a nonprofit organization for children with special needs.

The project's goal is to develop handicapped children's skills by unobtrusively steering them to accomplish a specific set of tasks — for example, designing, budgeting, building, testing, launching and, finally, reporting on the flight of a helium-filled weather balloon that carries a movie camera to record its trajectory. To run such a project, students form management, engineering, weather and ground-control and communications teams — and learn to work cooperatively.

At the workshop, teachers from a variety of schools and countries received pilot material on ballooning that can be tailored to their own classrooms. They practiced what they were to teach by building and launching their own weather balloon and camera, designed to be returned to earth via a parachute, which they also designed and fabricated. Here, workshop attendees watch the launch of a helium weather balloon, complete with parachute "cap" that will aid in retrieving the balloon after the release of its hanging recording camera.

In addition to facilities provided by OEP, assistance at BNL came from the meteorology group within the Oceanographic & Atmospheric Science Division, Department of Applied Science; and the Plant Engineering, Safeguards & Security, Safety & Environmental Protection and Supply & Materiel Divisions.

In Memoriam

Aditya K. Sambamurti, an assistant physicist in the Physics Department, died on March 18, after a valiant battle against cancer. He was 31 years old.

Adit Sambamurti came to BNL in August 1988, as a research associate with Physics' Electronic Detector Group (EDG). As a postdoc who had earned his Ph.D. at the Indiana University in 1988, he participated in the rare kaon decay Experiment 787 at the Alternating Gradient Synchrotron. He was named Assistant Physicist in August 1990.

"Adit's death is particularly tragic because of his youth and his great promise as a physicist," said EDG Leader Laurence Littenberg, "He not only made many contributions to carrying out E787, but suggested entirely new physics opportunities that could be explored with the detector. He was also one of the originators of a RHIC proposal. He was very imaginative and highly dedicated to his work. Personable, articulate and kind, he took pains to encourage students and younger staff. He will be sorely missed."

An enthusiastic member of the BNL community, Sambamurti was a member of the Theater Group and the BERA Concert Committee. He was also a founding member of the Toastmasters Club.

Adit Sambamurti was residing in the apartment area and had been on leave of absence since December. He is survived by his parents Uma and M.K. Sambamurti, and his sister Nitya Sambamurti Ghotge. He was cremated yesterday.

Sharon Smith (cont'd)

current patterns that move fast-growing planktonic herbivores into areas containing suitable plants to eat," explains Smith. "And, although my idea seems simple and straightforward, there was no previous systematic attempt to analyze the interaction of large-scale currents and secondary productivity, or to measure the effect."

By collaborating with physical oceanographers, Smith traces the water masses under investigation both forward and backward in time and space. These observations complemented her logging the changes in numbers and productivity, also temporally and spatially, of the organisms under her study.

To expand her collaborative research into the response of oceanic animals to physical forcing, Smith is next heading for the Greenland Sea and the Arabian Sea this summer.

Sharon Smith received her Ph.D. in zoology in 1975. After holding a BNL guest appointment in 1976, Smith joined the DAS staff as an assistant oceanographer in March 1978. She was promoted to an associate oceanographer in October 1980 and to her present title in September 1983, and was awarded tenure in May 1985. After serving as Deputy O&AS Division Head for almost two years, Smith became O&AS Division Head in October 1991.

Reports Available

The following reports are available to Laboratory staff and affiliates of DOE, AUI and NRC. Others may purchase the reports from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161. Staff members should call the designated contact.

BNL-52298
Contact: M. Heimerle, Ext. 4776
Fundamentals of Particle Beam Dynamics and Phase Space. W.T. Weng and S.R. Mane

BNL-52300
Contact: F. Ligon, Ext. 3709
The Future is Yours — Get Ready! Career Options in Scientific and Technical Fields. A. Kponou, F.V. Ligon and BNL Career Awareness Day Committee

BNL-52302
Contact: M. Larese, Ext. 3508
Workshop on Technology Issues of Superconducting Maglev Transportation Systems. J.E. Wegrzyn and D.T. Shaw

BNL-52292, Vol. I
Contact: K. Touhy, Ext. 3845
Proceedings of the CAP Meeting (1990-1991). Edited by Zohreh Parsa

BNL-52292, Vol. II
Contact: K. Tuohy, Ext. 3855
Proceedings of the CAP Meetings. (1991). Edited by Zohreh Parsa

Note to Employees:
Attendance at lectures, meetings and other special progams held during normal working hours is subject to supervisory concurrence.

Healthline Lecture

Money Matters, Part I — Financing a College Education

Since your financial health is very much related to your general well being, the next three Healthline lectures offered by the Health Promotion Program of the Occupational Medicine Clinic will discuss how to take care of your "Money Matters."

To be held from noon to 1 p.m. in Berkner Hall, the three Money Matters lectures are:

- "How to Finance Your Kid's College Education," Tuesday, March 24.
- "How to Budget Your Income," Thursday, April 9.
- "How to Plan Your Estate," Tuesday, April 28.

The first topic will be discussed by Sherwood Johnson, Director of Financial Aid and Student Employment at the State University of New York at Stony Brook.

Sherwood Johnson

Although the inflation rate in the '80s was low, the cost of college more than doubled during the last decade — placing college education nearly out of reach for many middle-class children. Many parents who had hoped to send their kids to private schools are now hoping that their children will qualify for financial aid at a public university.

As Johnson will explain, just as the three Rs are important for students to be successful in school, the three Ps — planning, programs and procedures — are important for the parents of college-bound kids, so they can finance their children's higher education at the school of their choice.

Sherwood Johnson is responsible for operation and fiscal management of the financial-aid offices for Stony Brook's undergraduate and graduate schools, health-sciences center, and medical and dental schools. He also serves as a consultant to the College Scholarship Service and the College Board, providing financial-aid workshops to financial-aid officers and guidance counselors.

To register for the first part of the Money Matters series, return the bottom portion of the Healthline flyer sent to all employees this week to Mary Wood, Bldg. 490.

For more information about the Health Promotion Program or its Healthline lecture series, call Ext. 5923.

Community Summer Science Program

The Office of Educational Programs (OEP) will again this summer offer its Community Summer Science Program to local high school students who have completed their junior or senior year in high school.

Over six weeks, from July 6 through August 14, morning lectures by BNL staff will be presented to the program's students, to introduce them to the fascination of forefront science. A limited number of afternoon internships with stipends are also available to these students, during which they participate in research or special in-depth courses, also under the direction of Lab staff.

Local high school teachers may also participate in the morning program, and, by special arrangement, in the afternoon program.

Applications for this program are now available from OEP, Ext. 4503, and preference will be given to student applications received before April 17. Members of the Lab staff who wish to serve as lecturers and/or research advisors are also asked to call Ext. 4503.

Dreadful Tales From the Annals of Amorous Misadventure

Murders Done for Love

A dramatic presentation of murder for love — from fact and fiction, for mature audiences

E.J. Wagner

Story Teller and Crime Historian

Saturday, March 28, 1992
8:00 p.m. — Berkner Hall
Brookhaven National Laboratory
$9 in advance – $10 at the door

For tickets and information:

		Anita Cohen	282-5054
		Pat Giacalone	282-4628
Vicki McLane	282-5205	Millie Laster	282-3775
Mary Wood	282-5923	Harriet Martin	282-3487

Sponsored by Brookhaven Women in Science for the benefit of the Renate W. Chasman Scholarship Fund.

Vote for BERA Board

Elections for two new members to serve on the Executive Board of the Brookhaven Employees Recreation Association (BERA) will take place each day next week. Eligible voters will be asked to choose two Board members from among the following four candidates:

- **April Donegain**, Fiscal Division
- **Haskell (Skelly) Frei**, Reactor Division
- **Raymond Lo Presti**, Central Shops Division
- **Denise Miesell**, Plant Engineering Division

Those eligible to vote in the BERA Board election include employees of BNL, AUI and DOE, as well as all other permanent, on-site employees.

Absentee ballots for employees who will not be on site next week will be accepted in person at the Recreation Office, Bldg. 185, through today.

Ballots may be cast as follows:

Date	Time	Place
Mon., 3/23	11:30-1:30	Berkner Hall
Tue., 3/24	11:30-1:30	Berkner Hall
Wed., 3/25	11:30-1:30	Berkner Hall
Thu., 3/26	10:00-2:00	Credit Union
Fri., 3/27	10-00-2:00	Credit Union

IBEW Meeting

Local 2230 IBEW will hold its regular monthly meeting on Monday, March 23, at 6 p.m., in the Knights of Columbus Hall, Railroad Avenue, Patchogue. On the agenda will be regular business, committee reports and the president's report.

Daffodil Days

Again this year, BERA will take part in Daffodil Days, an annual event sponsored by the Long Island Division of the American Cancer Society.

Bunches of daffodils will be sold in the lobby of Berkner Hall on Thursday, March 26, from 11:30 a.m. to 1 p.m., and in the BERA Sales Office on Thursday and Friday, March 26 & 27, from 9 a.m. to 2 p.m.

Each bunch of sunshine containing ten beautiful flowers will sell for $6.

Equipment Demo

Power supplies offered by Kepco, Inc., Long Island, will be exhibited in Berkner Hall on Thursday and Friday, March 26-27, from 10 a.m. to 2 p.m. As a supplier of both linear programmable and bench-top power supplies, Kepco will be showing their latest keyboard-controlled power supply, the DPS series, in which a remote talk-listen control is exercised via a simple RS232 connection. Kepco sales engineers Tom Fischer and Bob Epstein will be on hand.

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Swim Club

At this year's U.S. Merchant Marine Academy's masters' swim meet, on Sunday, Feburary 2, four members of the BNL Swim Team captured thirteen medals out of thirteen starts. Individually, Roger Klaffky set a personal record in the 200-yard backstroke of 2:48.63, knocking almost seven seconds off his previous best time of 2:55.37.

50-yard Freestyle

Peter Heotis	25.83	1st men 40-44
Roger Klaffky	29.75	3rd men 45-49

100-yard Freestyle

Peter Heotis	56.70	1st men 40-44

200-yard Freestyle

Peter Heotis	2:10.29	3rd men 40-44

100-yard Backstroke

Ron Wittlock	1:14.54	1st men 54-59
Roger Klaffky	1:17.53	2nd men 45-49

200-yard Backstroke

Ron Wittlock	2:45.56	1st men 54-59
Roger Klaffky	2:48.63*	2nd men 45-49

50-yard Breaststroke

Wlodek Guryn	33.19	2nd men 40-44

100-yard Breaststroke

Wlodek Guryn	1:15.25	3rd men 40-44
Roger Klaffky	1:25.25	1st men 45-49

200-yard Breaststroke

Wlodek Guryn	2:55.05	2nd men 40-44

100-yard Individual Medley

Ron Wittlock	1:22.36	2nd men 55-59

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The CCNY pool was fast, and so two BNL Swim Team members each set two personal records and two new BNL Swim Club records at the annual NYC Parks Department masters' swim meet, on Sunday, March 8.

Peter Heotis shaved 0.08 and 0.46 seconds off his 50-yard and 200-yard freestyle times to establish 25.05 and 2:08.53, respectively, as his personal and the club's new bests. In setting new personal and club records in the 100-yard and 200-yard backstroke at 1:12.66 and 2:41.25, respectively, Ron Wittlock removed 0.59 and 2.06 seconds from his previous respective times.

50-yard Freestyle

Peter Heotis	25.05*#	1st men 40-44

100-yard Freestyle

Peter Heotis	56.30	1st men 40-44

200-yard Freestyle

Peter Heotis	2:08.53*#	2nd men 40-44
Ron Wittlock	2:37.75	2nd men 55-59

100-yard Butterfly

Peter Heotis	1:03.59	1st men 40-44

50-yard Backstroke

Ron Wittlock	32.94	1st men 55-59
Wlodek Guryn	33.99	2nd men 40-44

100-yard Backstroke

Ron Wittlock	1:12.66*#	1st men 55-59

200-yard Backstroke

Ron Wittlock	2:41.25*#	1st men 55-59

50-yard Breaststroke

Wlodek Guryn	34.08	2nd men 40-44

100-yard Breaststroke

Wlodek Guryn	1:16.92	2nd men 40-44

200-yard Breaststroke

Wlodek Guryn	2:47.19	2nd men 40-44

* indicates personal record
\# indicates BNL Swim Club record

Arrivals & Departures

Arrivals

Donald V. DiMassimo.....Accel. Dev.
Diana L. Fisher.....Director's Office
Douglas H. Fisher.....Accel. Dev.

Departures

This list includes all employees who have terminated from the Lab, including retirees:

Kevin J. Randall.....NSLS

Live D.J. Night
Brookhaven Center Club
Friday, March 27
Starting at 5:30 p.m.

Software Demo

Daniel Blander of Visual Software, Inc., and Ron Eberhard of the Eberhard Engineering Group will give a presentation of AutoLook, a drawing-management tool designed specifically to support AutoCAD on SUN workstations using the OPEN LOOK graphical user interface. This demo will take place at 2 p.m. on Monday, March 23, in the CCD Seminar Room on the second floor, Bldg. 515.

Bowling

Red/Green League

R. Larsen had a 255/619 scratch, A. Warkentien 226, K.K. Koebel 212, R. Wiseman 204, E. Carter 203, M. Palumbo 202/200, E. Meier 200, E. Sperry IV 200.

White League

John McCarthy had a 240, Ed Sperry IV 225, Kay Conkling 193, Sharon Smith 190.

Purple League

George Munoz had a 220, Phil Radusewicz 219, Maryann Reynolds 200/198, Fran Brown 200, Nancy Erickson 187, Mary Addessi 185, Caryl MacDougall 180.

Coming Up

The Leontovych String Quartet will appear in concert in Berkner Hall on Tuesday, March 31, at 8 p.m. The program includes: Mozart's Quartet in C Major, K. 465, "Dissonant"; Quartet Op. 11 by Samuel Barber; and Quartet No. 8, Op. 110 by Dmitriyevich Shostakovich.

Tickets will be sold at the door for $12, general admission; $9, students and people over 65; and $5, youths under 18.

Amateur Radio Club

The regular meeting of the Amateur Radio Club will take place on Thursday, March 26, at noon in Berkner Hall, Room D.

The agenda includes: update on the digital packet switch project; upcoming changes and improvements to the FM voice-repeater system and remote site links; and the HF ham station in the Recreation Building.

All Lab employees, guests and licensed radio amateurs are invited. For information, call John McNeil, Ext. 4572, or Gary Utz, Ext. 3580.

Volleyball

Standings as of March 11

Open League		League I	
Magnum	39-6	Upfagrabs	48-12
G-Team	26-19	Network News	44-19
Me and the Boys	25-20	Rude Dogs	38-22
Phoenix	22-23	Dinkers	34-26
Penetrating Vollies	12-33	Six Pack Attack	28-35
Leftovers	11-34	Setups	18-45
		Bumps & Sets	6-57
League II		**League III**	
Monday Night Live	35-4	Nutcrackers	32-16
Net Wits	29-13	Over the Top	32-19
Fossils	23-16	Interns	30-18
Just Ups	23-16	Renegades	30-18
Night Court	21-18	High Volley'em	28-20
Nuts & Bolts	20-19	Sourcerers	23-25
Volley of the Dolls	14-25	Good Timers	22-26
Upton Ups	10-32	Silver Bullets	10-38
Muffits	5-37	Undertakers	9-36

Cafeteria Menu

Monday, March 23

Soup: Chicken rice	.80/1.10
Entree: Chicken fajita	3.20
Entree: Fajita flyers	3.20
Fitness: Fried fish w/fries	3.20
Carvery: Pastrami sandwich	2.95
Grill: Mushroom cheddar burger w/fries	2.95

Tuesday, March 24

Soup: Cream of broccoli	.80/1.10
Entree: Boneless chicken breast w/veg.	3.20
Entree: Chef's choice	3.20
Fitness: Baked fish w/1 veg.	3.45
Carvery: Hot roast beef sandwich	2.95
Grill: 747 sandwich	2.95

Wednesday, March 25

Soup: Vegetable beef	.80/1.10
Entree: Stuffed manicotti w/1 veg.	3.20
Entree: Chef's choice	3.20
Fitness: Stir-fried beef over rice	3.45
Carvery: Baked Virginia ham sandwich	2.95
Grill: Airborne combo	2.95

Thursday, March 26

Soup: Vegetable barley	.80/1.10
Entree: Chicken cordon bleu	3.45
Entree: Chef's choice	3.20
Fitness: Seafood linguini	3.20
Carvery: Hot corned beef sandwich	2.95
Grill: Tenderloin take off	2.95

Friday, March 27

Soup: New England clam chowder	.80/1.10
Entree: Chef's choice	3.20
Entree: Pork Creole w/1 veg.	3.35
Fitness: Baked fish w/1 veg.	3.45
Carvery: Hot turkey sandwich	2.95
Grill: Flying wings	2.95

Breakfast w/coffee & small juice 2.75

Mon.: 2 eggs, bacon, pancake, home fries
Tue.: Western omelet, home fries, toast
Wed.: Spanish omelet, home fries, toast
Thu.: 2 eggs, bacon, cheese on croissant, fries
Fri.: French toast, 2 eggs, bacon, home fries

Classified Advertisements

Placement Notices

The Laboratory's placement policy is to select the best-qualified candidate for an available position. Consideration is given to candidates in the following order: (1) present employees within the department/division and/or appropriate bargaining unit, with preference for those within the immediate work group; (2) present employees within the Laboratory; and (3) outside applicants. In keeping with the Affirmative Action plan, selections are made without regard to age, race, color, religion, national origin, sex, handicap or veteran status.

Each week, the Personnel Division lists new placement notices. The purpose of these listings is, first, to give employees an opportunity to request consideration for themselves through Personnel, and, second, for general recruiting under open recruitment. Because of the priority policy stated above, each listing does not necessarily represent an opportunity for all people.

Except when operational needs require otherwise, positions will be open for one week after publication.

For more information, contact the Employment Manager, Ext. 2882, or call the JOBLINE, Ext. 7744 (282-7744), for a complete listing of all openings.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside candidates.

LF 5089. COMPUTING POSITION - Requires a BS in computer science with several years' experience with C, Unix, X-Windows and Motif. Experience with real-time programming using a commercial kernel, database software, process control and interfacing with hardware is desirable. Responsibilities will include the development of software in a control and data acquisition environment, which will require interfacing with physicists, engineers and operators to assist in the definition of hardware and software requirements for the operation of synchrotron storage rings. National Synchrotron Light Source Department.

LF 8062. BIOLOGY ASSOCIATE POSITION (part-time) - Requires a BS in biochemistry or molecular biology. Previous practical experience in DNA technology is desirable. Responsibilities include working on a human genome project, as well as participating in all stages of DNA sequencing. Biology Department.

LF 8063. BIOLOGY ASSOCIATE POSITION (term appointment) - Requires a BS in biochemistry, biology or chemistry. Previous experience with chloroplast isolation and molecular biology desirable. Duties include studies of protein phosphorylation using radioisotope, protein purifications and enzyme kinetics. Biology Department.

DD 8131. TECHNICAL POSITION - Requires AAS in engineering or physical science or equivalent experience; AAS in health physics is highly desirable. Responsibilities will include routine radiation and contamination surveys, participation in respirator, industrial hygiene and general safety training programs is required as is availability for shift work. Safety and Environmental Protection Division.

Motor Vehicles & Supplies

84 DODGE ARIES - p/s, p/b, am/fm, 67k mi., $1,400. Carol, Ext. 2673.

83 OLDS DELTA ROYALE - metallic brown, a/t, p/w, cruise, fully loaded, 87k mi., orig. owner, $1,700. Chan, Ext. 4059.

77 FORD LTD II - 302 cu. in. V-8, a/t, p/s, p/b, ac, new battery & brakes, runs well, $500. Frank, Ext. 7519, or Vita, 277-0464.

CAP - for Toyota, black, good cond., $125. Jack, Ext. 2907.

CASSETTE CAR STEREO - Pioneer, under dash, auto reverse, loudness button. all parts incl., like new, no am/fm radio, $50. Sue, Ext. 4931.

91 ACURA INTEGRA LS - 5-spd., p/w & sunroof, am/fm cass. w/equalizer, factory alarm, spoiler, 6k mi., $14,900 neg. Ext. 5919 or 722-3010.

89 VW JETTA GLi - 1.8 liter, 16 valve eng., Recard seats, anti-lock brakes, am/fm cass., alarm, sunroof, white, must sell, ask. $7,500. John, Ext. 2788.

89 JEEP CHEROKEE - red, 47k mi., 4-dr., 4wd, 6-cyl., a/t, tilt, cruise, am/fm cass., ac, warr. transferable, $11,500. Vera, Ext. 7702.

89 MITSUBISHI GALANT - low mi., $6,750 neg. 363-7032.

89 NISSAN SENTRA - 2-dr., 4-spd., white, sunroof, excel. cond., 744-5422.

88 FORD CLUBWAGON VAN - 35k mi., new tires, recently tuned, heavy-duty suspension, V-8 eng., fuel inj., excel. cond., $7,500. Victor, Ext. 2395.

88 BUICK SKYHAWK - s/w, 4-dr., a/t, ac, cruise, 35k mi., stereo, $4,800. 273-3853 before 3 p.m.

87 JETTA - 55k mi., a/t, needs some work, Ext. 3983.

87 OLDS FIRENZA - cruise, p/s, p/b, ac, tilt, am/fm cass., 71.3k highway mi., excel. tires, mint cond. $3,800. 589-2759.

86 CUTLASS CIERRA - gray, 4-dr., am/fm, ac, 4-cyl., $900. Lynette, 698-6609.

86 FORD F-150 2x4 TRUCK - 6-cyl., 4-spd., p/s, p/b, clean, 75k mi., $4,400. 928-6387.

86 D-100 PICKUP - 6-cyl., m/t, cap, new tires & battery, 54k mi., must see. Tom, Ext. 7287.

85 PONTIAC 6000 - 4-dr. sedan, 82k mi., cruise, p/s, p/b, V-6, am/fm cass., new batt., front tires, shocks & struts, $2,500. John, 732-7568.

85 HONDA ACCORD LX - a/t, ac, p/w, p/l, cruise, stereo cass., 83k mi., clean, v.g. cond., $3,950. Ext. 2679 or 472-6922.

84 FORD ESCORT - s/w, new $360 clutch, battery & tires, 78k mi., runs well, little rust, $750 or best offer. Ext. 7897 or 331-0807.

84 CAMARO - V-6, 66k mi., red, am/fm cass., good cond., no rust, very reliable. Tarshea, Ext. 2821.

84 OLDS DELTA 88 - am/fm cass., ac, p/seats, 97k mi., excel. cond., $1,875. Ext. 4650.

84 DODGE OMNI - ac, 5-spd., 115k mi., new timing belt, battery, muffler, etc., needs clutch. Ext. 3983.

84 CHEVY LUXURY VAN - fully factory customized, 89k mi., clean, runs well, has all the goodies, $3,995. Roy, Ext. 7357 or 878-5886.

84 DODGE ARIES - 4-dr., a/t, $700. Ext. 3845.

82 YAMAHA 400 HS - 6k mi., all access., $650 neg. Rob, 878-2702 after 6:30 p.m.

82 TOYOTA COROLLA - p/b, p/s, ac, stereo cass., sunroof, reliable, good cond., $1,200. 744-4185.

78 OLDS DELTA 88 - 4-dr., mech. sound cond., good tires, exhaust, new carb., $500. 744-6423.

76 CHEVY NOVA - rust spots but runs OK, best offer. Ellie, Ext. 7328.

75 GM MIDGET - 54k orig. mi., new exhaust, excel. mech. cond., v.g. body & int., new car cover, $2,250 neg. 385-8075.

70 YELLOWSTONE TRAVEL TRAILER - 18', v.g. cond., many extras. Frank, Ext. 7684 or 584-5933 after 6 p.m.

67 MUSTANG - white, mint body, orig. int., 289 eng., a/t, $5,500 firm. 698-2798.

WHEELS - 4, slotted, for Ford pickup, need paint, $75. Kathy, Ext. 2223.

LIFT KIT - for Chevy truck, 2". Ext. 2284.

AMC HORNET - $200. Kathy, 744-2203.

DATSUN UTILITY TRAILER - frame, box, axle, 14" wheels, extendable box tongue, 2" coupler, $225. Paul, Ext. 2177.

LADDER RACK - heavy-duty, Dodge Ram 50-size pickup bed, tool locker, ladders, alum. Wen 20', 28'. Roger, Ext. 2382.

TIRES - 2, mud & snow, P225/75R15, $20; one P205/75R15, GoodYear, m&s, $5; P195/75R15, full tread, no rim, $25. Chuck, 589-1069.

RIMS - 4, 15", 6-lug w/wheel covers for Chevy truck, $20. Roger, Ext. 7518 or 878-8847.

Boats & Marine Supplies

28' BAYLINER CONTESSA - 1984, flybridge, Bimini, hydraulic steering, Volvo, VHF, DF, head, shower, galley, sleeps 6, $15,000. Biele, Ext. 3698.

26' OWENS - 1964, full 8'x12' f/g sunroof, sleeps 4, VHF, head, 327, excel. bay/family boat, first $750. Roger, Ext. 2382.

26' SEARAY SUNDANCER - 1984, cabin sleeps 6, stove, frig., head, hot shower, camper back, Loran, many extras, $21,000. 751-8133 after 6 p.m.

24' SEARAY - flybridge, many extras, good cond., asking $6,000. 475-9643 or 289-1726.

23' CHRIS CRAFT LANCER - new canvas, cuddy cabin, 2 bunks, new V-8 engine, 30-40 hrs. on eng., outdrive power. Ron, Ext. 4715.

22' SPORTCRAFT OFFSHORE - 1987, cuddy, full gauges, dual batt. setup, no motor, '88 E-Z Loader trailer, tandem axle w/brakes. 744-7549.

18' VICTORIA - tilt trailer, 4.5-h.p. Merc., jib, main, Genoa, cruising spinnaker, VHF, DF, K/M, sleeps 2, shoal keel, $3,650. Mike, Ext. 5972 or 744-4579.

16' BOWRIDER - 65-h.p. Evinrude, galv. trailer, p/winch, $1,500. Jim, Ext. 3372 or 821-0250.

14' HOBIE CAT - turbo, roller reefing jib, trailer, $1,400; 18' Klepper, f/g, double kayak, $500. Ext. 7657.

10' GAMEFISHER - w/5.5-h.p. Johnson, 12' trailer, tilt tank, bumpers, 2 seats, also 10' dingy, f/g, all for $950. Paul, Ext. 5215.

CHRIS CRAFT - 1959, T/350s FWC, all elect., sleeps 4-6, $3,000 firm; Carver, 1973, T/302s FWC, more, $12,000 neg. Harry, Ext. 7527 or 744-2715.

OUTBOARD - 1983, 175-h.p. Evinrude, long-shaft, good cond., asking $1,650. Dan, Ext. 2075.

DOCK SPACE AVAILABLE - Center Moriches, exchange for landscaping services, average size yard, suitable for boat to 21'. George, 878-8177.

Furnishings & Appliances

DINING ROOM SET - antique, 6 upholstered chairs, reasonable. 363-7032.

SOFA - & chair, contemp., brown leather-like, glass top end table, $175; bookcase, $60; wing chair, $85; 2 director's chairs, $15. 732-1389.

BED - twin, boxspring, mattress, white, early American, match. student desk, $110. 727-4884.

BEDROOM - 4-poster, full bed, pine, armoire, 2 nightstands, lamps, $375. Hurst, Ext. 3844.

BUNK BEDS - can be two single beds, excel. cond., $125. Ext. 4650.

CABINET - Col., maple, record player, radio, TV, 72" x 35" x 23", $350; trestle table, pine, 48"x24", w/2 leaves & 2 benches, $150. S. Saxon, 929-4701.

CHESTS - two, 3-drawers, $15/ea. 727-8631.

DINING ROOM TABLE - leaf, 6 chairs, good cond. Carole, 467-2017.

GARBAGE COMPACTOR - Kitchen-Aid, model KCS-200, fits under standard countertops, white, asking $110. Leo, Ext. 2273.

HIGH RISER - w/bolsters, back frame & cover, excel. cond., $135. 727-6481.

KITCHEN TABLE - dark pine, 4 chairs, 38"w x 60"l; pine dresser w/mirror, 12 drawers, best offer. Linda, 821-3009.

LIVING ROOM - Colonial, 2 sofas, 1 chair, 3 tables, lamp, excel., $450; dining table, 6 chairs, $200. Norman, Ext. 3847.

OVEN - Farberware convection, 13¼"d x 20½"l x 14"h, drip tray, rack, like new, $100. 475-7257.

RANGE - GE, elec., self-clean, 3 yr. old, $300 neg. Gene, Ext. 7113 or 874-4248 after 6 p.m.

SHOWER BASE - corner, 38", white, new, orig. $200, sell for $100. Ext. 3492 or 289-6844.

SOFA - 7', wood trim, pillow back, golden beige, excel. cond. 744-5422.

SOFA - papasan, 2 papasan chairs, w/footstool & pillows, rattan, gray/mauve print, excel. cond., $250 neg. Carla, 821-6252.

TABLE - 4 chairs, $50; dresser, headboard, 2 nightstands, $50; foot pedal sewing machine, $50; bureau, $50; dresser w/mirror, $50. 878-6637.

TABLE - 48" round w/two 12" leaves, pine, 4 captain's chairs, $300; 4-drawer dresser, bleached oak, matching single headboard, $200. 744-8567.

TABLE - glass top, 72"x42", marble base, excel. cond., orig. $600, sell for $250 neg. Don or Jackie, 744-2921.

VACUUM - Hoover Dimension, 4.7hp, good cond., all parts, manual, $175 neg. Ext. 7110 or 874-3652.

WASHING MACHINE - $50; refrigerator, $50; bi-fold doors, $10; stereo, $50; sink, $25; fans; many other items. Bob, Ext. 7785.

WATER BED - queen, motionless, stained oak, headboard, set-up, all incl. Vic, 737-6517.

Tools, House & Garden

WINDOW - Andersen, triple, 4'x6', thermal pane, w/bottom louvers, $500. 929-6235 after 5 p.m.

AMARYLLIS BULBS - large, potted, budded, $3/ea. 727-8631.

FIREWOOD - split, oak. J. Scesny, 732-2849.

GAS GRILL - Arkla, dual burner, chrome, warming rack, shelf, rotisserie, includes electric motor, $125. 475-7527.

HEATER - kerosene, like new, hardly used, all access., $125. 698-2798.

HOT WATER HEATER - oil-fired, 60-gallon tank w/.75-1.5-gallon/hour retention-head burner. Harry, Ext. 7527 or 744-2715.

KEROSENE HEATER - Sanyo, 10,000 Btu, $40. Neal, Ext. 2254.

LAWN MOWER - Sears Craftsman, self-propelled, electric start, rear bagger, used only 2 seasons, orig. $550, sell for $225. Ext. 2679 or 472-6922.

CHAISE - redwood, 2 chairs, cush., covers; sewing machine; dining room lamp; back pack; parrot cage; finches; rabbit. Kelly, 744-3069.

TOPSOIL - fine screened, $20/yard, delivered; unscreaned, $15/yard, delivered. 696-6011.

WATER JET PUMP - best offer. Lynette, 698-6609.

Sports, Hobbies & Pets

BICYCLE - Colnago Master, 56cm, w/Dura Ace head set, BB. Oscar, Ext. 3499.

FISH TANK - salt-water setup, $75. Christa, Ext. 7318.

GOLF CLUBS - Titleist tour blade irons, 1 through PW, good cond., $200. Phil, 433-6041 after 7 p.m.

GUITAR - Takamine F349, w/case, mahogany, mint, $200. 698-2798.

LABRADOR RETRIEVER - AKC registered, 1 yellow male, 8 wks. old, health certified. Mrs. Baker, 286-8552.

PIANO - Kohler and Campbell, tuned regularly, excel. cond., $550; car-top carrier, clamshell, 200 lb. capacity, used 3 trips, $65. 286-0682.

PLAYHOUSE - Cabbage Patch Kids, molded vinyl, w/carpeted deck, stools & table, orig. $150, sell for $65. Linda, 744-0722.

POOL - ag, 20' dia., w/attachments, make offer. 472-6922.

WATER PUMP - for swimming pool, w/motor for slide fountain pond, Little Giant, $25; motor alone, $13. 727-3608.

WEIGHT-LIFTING BENCH - good cond., $30. Victor, Ext. 2395.

Audio, Video & Computers

COMPUTER - Apple, dual processor, II+/CPM-80, dual drives, monitor, Epson NLQ FX-80 printer, software, $250. Don, 744-2921.

COMPUTER - monitor, Lear Siegler, mono working, $10; data terminal keyboard & screen Datamation, working, $10. Victor, Ext. 2395.

COMPUTER - Amiga-1000, 1 meg RAM, 2 DS/DD floppy drives, over 100 programs, WD Star NX-10 printer, asking $600/all. Ext. 3701 or 751-8128.

COMPUTER - XT, 640k, 21-meg hard drive, co-processor, CGA, mouse, $500. Ext. 2284.

MATH CO-PROCESSOR - 80287-10, for 16MHz, $65; Genor EGA card, w/utility disks & manual, $50. Marty, Ext. 2521 or 286-7480.

TV - Sears, portable, b&w, fm radio, ac, battery, $50; Magnavox portable TV, 12", b&w, $50. Van, Ext. 7039 or 289-8428.

COLOR TV - Sharp, 19", 1 yr. old, $175 firm. Neal, Ext. 2907.

Miscellaneous

BABY'S CLOTHES - boy's newborn-4T, girl's newborn-18 mo.; infant's toys; 2-piece swing; playpen; carriage; car seat; more. Mary, 924-6235.

COFFEE POT - stainless, $20; hammock, $10; seed spreader, $10; typewriter, $10; redwood chair, $30; weed wacker, $30. Kathy, 744-2203.

CRIB - light wood/brass, storage drawer, orig. $700, asking $300; high chair, all wood, carved, $50; playpen, $30. Barbara, 744-9802.

ENCYCLOPEDIA - Americana, complete set, 30 volumes incl. index, old but good cond., $100. Saxon, 929-4701.

GOWNS - women's, worn once, white, 11/12, satin lace, $40; pink, 15/16, satin lace, $80; purple, 7/8, satin, $25; blue, 9/10, $25. Heidi, 281-7873.

SUITCASES - 2, hard, 1 fits in other for storage, v.g. cond., $25. Joann, Ext. 5671 or 472-6742.

TEMPLATES - lettering, full sets of Greek & English, extras, $150/set. Ext. 3492 or 289-6844.

TICKETS - Broadway, *Miss Saigon*, Sat., 6/20, 2 p.m., 1st row balcony, $65/ea. Inan, Ext. 3372.

TICKETS - 3 orchestra seats, Little Orchestra Society children's concert & ballet, Sat., 4/11, 1 p.m. Bob, Ext. 7785.

TYPEWRITER - Olivetti, manual, port., good cond., $25. Gene, Ext. 7113 or 874-4248 after 6 p.m.

YARNS - knitting, crotcheting, all colors. Chris, 281-6233.

PLOT - Pinelawn, grave 80, plot G, block 3, Garden of Remembrance, sec. 60. Tom, 821-0329.

Free

DINING ROOM - 4 chairs, table, 2 servers, china closet, circa 1930, needs some TLC, you pick up. Richie, Ext. 5317.

DISHWASHER - Ext. 2284.

DOG - Lab mix, male, 9-mo.-old, very friendly, housebroken. Victor, Ext. 2395.

DOG - sheep dog/poodle mix, 5-yr.-old, very affectionate, needs good adult-only home, shots all up to date. 472-6087.

DOGHOUSE - good cond. Ext. 5249 or 331-5874.

PIANO - Gulbansen upright, very old, needs work. Mrs. Agostine, 588-6853.

Wanted

CAR - used, h/b, from mid-80s, $2,000 or less, should be in good cond. Uwe, 286-3701.

CB - 40-channel, w/all controls in microphone, cash. Dave, Ext. 7268.

DANCERS - to join newly forming BERA Swing & Latin Dance Club. Walter, Ext. 3086.

HESS TRUCKS - by private collector, cash waiting. Jim, Ext. 4026.

RAFTERS - for Gauley River trip, 9/12, $200 complete, space limited. Doris, Ext. 4669.

RIDE - for student to Uniondale near Hofstra in a.m. from Smithtown and return in p.m., will pay. Charles, Ext. 4169.

ROOMMATE - share house in Sound Beach, fully furnished, smoker or nonsmoker, 15 min. from Lab, cable, own phone. 821-2875.

SEARS LAWN TRACTOR - for parts, need mower deck & cowling, will buy parts or whole. Jim, Ext. 4026.

WASHER & DRYER - stackable. Steve, Ext. 5215.

In Appreciation

We would like to thank all the friends and colleagues of our son and brother Aditya Sambamurti, who have given us so much love and support during this difficult period. We will always cherish your kind gestures in our memories.

— Uma & M.K. Sambamurti
and Nitya Sambamurti Ghotge

Classified Ad deadline is 4:30 p.m. Friday for publication Friday of the next week.